In the Claims

1. (original) A modular optical switch fabric comprising:

an optical chassis; and

at least one optical module removably coupled to the optical chassis, the at least one optical module including a collimator panel and a beam steering panel secured to a frame member, the frame member being configured to position the collimator panel in fixed optical alignment relative to the beam steering panel.

2. (original) The fabric of claim 1, wherein the optical chassis includes at least one chassis connector to accommodate the at least one optical module.

3. (original) The fabric of claim 2, wherein the at least one optical module includes at least one module connector that mates with the at least one chassis connector.

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4. (original) The fabric of claim 2, wherein the at least one optical module receives electrical control signals via the at least one chassis connector.

5. (original) The fabric of claim 1, wherein the optical chassis is formed in a folded Z-shaped configuration having a first wing, a center portion and a second wing.

6. (original) The fabric of claim 5, wherein at least one input optical module is disposed in the first wing, a reflective element is disposed in the center portion, and at least one output optical module is disposed in the second wing.

7. (original) The fabric of claim 1, wherein the optical chassis is substantially in a cylindrical shape.

8. (original) The fabric of claim 7, wherein the cylindrical shape further comprises:

a central cylindrical core portion having a first base and a second base, a reflector being disposed on the first base; and

a ring portion disposed around the central cylindrical core portion, the ring portion including a first annulus disposed around the first base, a second annulus disposed around the second base, and a lateral portion disposed between the first annulus and the second annulus, the ring portion having the at least one optical module disposed therein.

9. (original) The fabric of claim 8, wherein the ring portion includes a plurality of substantially prism shaped segments disposed , each prism shaped segment accommodating an optical module.

10. (original) The fabric of claim 8, wherein the collimator panel is disposed on the first annulus, the beam steering panel is disposed on the second annulus, and the light signal propagates in the lateral portion disposed therebetween.

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11. (original) The fabric of claim 8, wherein the reflector includes a substantially convex mirror.

12. (original) The fabric of claim 1, further comprising a mirror element coupled to the optical chassis, the mirror element being in optical communication with the at least one optical module.

13. (original) The fabric of claim 12, wherein the mirror element is substantially convex.

14. (original) The fabric of claim 1, wherein the collimator panel includes at least one collimator in fixed alignment with at least one beam steering pixel disposed on the beam steering panel.

15. (original) The fabric of claim 14, wherein the at least one beam steering pixel includes a MEMS mirror element.

16. (original) The fabric of claim 14, wherein the at least one beam steering pixel includes a gimbaled mirror element having at least two-degrees of beam steering freedom.

17. (original) The fabric of claim 14, wherein the at least one beam steering panel includes a plurality of individually steerable mirror elements.

18. (original) The fabric of claim 17, further comprising a control system coupled to the beam steering panel, the control system being configured to provide a control signal to each of the individually steerable mirror elements.

19. (original) The fabric of claim 17, wherein the plurality of individually steerable mirror elements includes at least 324 individually steerable mirror elements, each individually steerable mirror element being in fixed alignment with a corresponding collimator disposed on the collimator panel.

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20. (original) The fabric of claim 1, wherein the beam steering panel includes an electrical plug-in connector that mates with the an electrical optical chassis connector.

21. (original) The fabric of claim 1, further comprising a control system for providing the beam steering panel with electrical control signals.

22. (original) A modular optical switch fabric comprising:

an optical chassis;

a reflective element attached to the optical chassis; and

at least one optical module mechanically coupled to the optical chassis and optically coupled to the mirror, the at least one optical module including a collimator panel and a beam steering panel secured to a frame member, the frame member being configured to position the collimator panel in fixed optical alignment relative to the beam steering panel.

23. (original) A modular optical switch fabric comprising:

an optical chassis; and

at least one pair of optical modules coupled to the optical chassis, a first optical module of the pair of optical modules being optically coupled to a second optical module of the pair of optical modules, each optical module including a collimator panel and a beam steering panel secured to a frame member, the

frame member being configured to position the collimator panel in fixed optical alignment relative to the beam steering panel.

24. (original) The fabric of claim 23, further comprising a mirror element coupled to the optical chassis, the mirror element providing optical communication between the first optical module and the second optical module.

25. (original) The fabric of claim 23, wherein the first optical module is configured to direct at least one light signal into the switch fabric and the second optical module is configured to direct the at least one light signal out of the switch fabric.

26. (original) The fabric of claim 23, wherein the optical chassis is formed in a folded Z-shaped configuration having a first wing, a center portion and a second wing.

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27. (original) The fabric of claim 26, wherein the first optical module is disposed in the first wing, a reflective element is disposed in the center portion, and the second optical module is disposed in the second wing.

28. (original) The fabric of claim 23, wherein the optical chassis is substantially in a cylindrical shape.

29. (original) The fabric of claim 28, wherein the cylindrical shape further comprises:

a central cylindrical core portion having a first base and a second base, a reflector being disposed on the first base; and

a ring portion disposed around the central cylindrical core portion, the ring portion including a first annulus disposed around the first base, a second annulus disposed around the second base, and a lateral portion disposed between the first annulus and the second annulus, the ring portion having the at least one optical module disposed therein.

30. (currently amended) The fabric of claim 28, wherein the ring portion includes a plurality of substantially prism shaped segments ~~disposed~~, each prism shaped segment accommodating an optical module.

31. (original) The fabric of claim 28, wherein collimator panels are disposed on the first annulus, beam steering panels are disposed on the second annulus, and the light signal propagates in the lateral portion disposed therebetween.

32. (original) The fabric of claim 28, wherein the reflector includes a substantially convex mirror.

33. (original) The fabric of claim 28, wherein each collimator panel includes at least one collimator in fixed alignment with at least one beam steering pixel disposed on a corresponding beam steering panel.

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34. (currently amended) The fabric of claim 33 ~~34~~, wherein the at least one beam steering pixel includes a MEMS mirror element.

35. (currently amended) The fabric of claim 33 ~~34~~, wherein the at least one beam steering pixel includes a gimbaled mirror element having at least two-degrees of beam steering freedom.

36. (currently amended) The fabric of claim 33 ~~34~~, wherein the at least one beam steering panel includes a plurality of individually steerable mirror elements.

37. (currently amended) The fabric of claim 36 ~~37~~, further comprising a control system coupled to the beam steering panel, the control system being configured to provide a control signal to each of the individually steerable mirror elements.

38. (currently amended) The fabric of claim 36 ~~37~~, wherein the plurality of individually steerable mirror elements includes at least 324 individually steerable mirror elements, each individually steerable mirror element being in fixed alignment with a corresponding collimator disposed on the collimator panel.

39. (currently amended) The fabric of claim 23, wherein the beam steering panel includes an electrical plug-in connector that mates with ~~the~~ an electrical optical chassis connector.

40. (original) The fabric of claim 23, further comprising a control system for providing the beam steering panel with electrical control signals.

41. (original) A modular optical switch fabric comprising:

an optical chassis having a chassis connector; and

at least one optical module having an optical module connector mating with the chassis connector such that the at least one optical module is removably coupled to the optical chassis, the at least one optical module including a collimator panel and a beam steering panel secured to a frame member, the frame member being configured to position the collimator panel in fixed optical alignment relative to the beam steering panel.

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42. (original) A modular optical switch fabric comprising:

an optical chassis having at least one first chassis connector and at least one second chassis connector;

a reflective element attached to the optical chassis; and

at least one pair of optical modules including a first optical module and a second optical module, the first optical module having a first optical module connector mating with the at least one first chassis connector and the second optical module having a second optical module connector mating with the at least one second chassis connector such that the first optical module is optically coupled to the second optical module via the reflective element, each optical module including a collimator panel and a beam steering panel secured to a frame member, the frame member being configured to position the collimator panel in fixed optical alignment relative to the beam steering panel.

43. (original) An optical module for use in an optical switch fabric, the optical module comprising:

a frame member;

a collimator panel secured to the frame member; and

a beam steering panel secured to a frame member, whereby the collimator panel is in fixed optical alignment relative to the beam steering panel.

44. (currently amended) The fabric of claim 43 ~~45~~, wherein each collimator panel includes at least one collimator in fixed alignment with at least one beam steering pixel disposed on a corresponding beam steering panel.

45. (currently amended) The fabric of claim 44 ~~46~~, wherein the at least one beam steering pixel includes a MEMS mirror element.

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46. (currently amended) The fabric of claim 44 ~~46~~, wherein the at least one beam steering pixel includes a gimbaled mirror element having at least two-degrees of beam steering freedom.

47. (currently amended) The fabric of claim 44 ~~46~~, wherein the at least one beam steering panel includes a plurality of individually steerable mirror elements.

48. (currently amended) The fabric of claim 47 ~~49~~, wherein the plurality of individually steerable mirror elements includes at least 324 individually steerable mirror elements, each individually steerable mirror element being in fixed alignment with a corresponding collimator disposed on the collimator panel.

49. (original) A method for directing a light signal in an optical switch fabric, the optical switch fabric including an optical chassis, the method comprising:

providing at least one optical module removably coupled to the optical chassis, the at least one optical module including a collimator element and a beam steering element each secured to a frame member, the frame member being configured to position the collimator element in fixed optical alignment relative to the beam steering element; and

inputting the light signal into the optical module via the collimator element, whereby the light signal is automatically directed onto the beam steering element by virtue of the fixed optical alignment provided by the frame.

50. (currently amended) The method of claim 49 ~~51~~, wherein the step of providing includes providing a pair of optical modules, the pair of optical modules including a first optical module and a second optical module.

51. (currently amended) The method of claim 50 ~~52~~, further comprising the step of directing the light signal from a first beam steering element on the first optical module to a second beam steering element on the second optical module.

52. (currently amended) The method of claim 51 ~~53~~, wherein the step of directing the light signal from a first beam steering element includes reflecting the light signal off of a mirror element.

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53. (original) A method for directing a light signal in an optical switch fabric, the optical switch fabric including an optical chassis and a reflective element mounted on the optical chassis, the method comprising:

providing at least one pair of optical modules removably coupled to the optical chassis, a first optical module of the pair of optical modules being optically coupled to a second optical module of the pair of optical modules via the reflective element, the first optical module including a first collimator element and a first beam steering element secured to a first frame member, the first frame member being configured to position the collimator element in fixed optical alignment relative to the first beam steering element, the second optical module including a second collimator element and a second beam steering element secured to a second frame member, the second frame member being configured to position the collimator element in fixed optical alignment relative to the beam steering element;

directing the light signal into the first optical module via the first collimator element, whereby the light signal is automatically directed onto the first beam steering element by virtue of the fixed optical alignment provided by the first frame; and

steering the light signal from the first beam steering element to the second beam steering element via the reflective element, whereby the light signal is

automatically directed into the second collimator element by virtue of the fixed optical alignment provided by the second frame.

54. (original) A method for maintaining an optical switch fabric being used to direct signal traffic, the signal traffic including light signals being directed from input fibers to output fibers, the method comprising:

providing an optical chassis having a plurality of plug-in slots, the plug-in slots including at least one repair slot;

inserting a plurality of first optical modules into the plug-in slots of the optical chassis, the at least one repair slot being unused; each optical module including a collimator element and a beam steering element each secured to a frame member, the frame member being configured to position the collimator element in fixed optical alignment relative to the beam steering element; and

detecting a maintenance condition; and

inserting at least one second optical module into the at least one repair slot in response to the maintenance condition; whereby the signal traffic is not interrupted.

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55. (currently amended) The method of claim 54 ~~56~~, wherein the maintenance condition includes the detection of a failed optical module.

56. (currently amended) The method of claim 55 ~~57~~, further comprising the step of removing the failed optical module.

57. (currently amended) The method of claim 54 ~~56~~, wherein the maintenance condition includes a scheduled maintenance action.

58. (currently amended) The method of claim 54 ~~56~~, wherein the maintenance condition includes adding at least one new optical module to thereby increase optical switch fabric capacity.